Navy Engineering Drawing Data Flow

White Paper

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Proposed Navy Infrastructure

Engineering Drawing Maintenance and Indexing

Each designated Engineering Drawing Maintenance Activity (EDMA) will maintain their cognizant drawings current and provide approved baseline and updated copies of drawing data to the appropriate engineering drawing data repository. Each repository will maintain an automated drawing index system which identifies all cognizant drawings and revision levels for the drawings they are responsible for storing. These drawings could be in digital or non-digital format. The drawing index data will agree with the drawings stored in the repository. All Joint Engineering Data Management and Information Control System (JEDMICS) repositories will continue to provide (in an automated fashion and on a daily basis) drawing Meta (index) data to the Joint Computer-aided Acquisition and Logistics Support (JCALS) Global Data Management System (GDMS) server. Meta index data will also be extracted from the Advanced Technical Information Support (ATIS) System drawing databases (at Newport News Shipbuilding and Electric Boat) and loaded into GDMS on a daily basis. All JEDMICS repositories will also provide (in an automated fashion and on a weekly basis) a specific set of drawing index data directly to the DoD standard Military Engineering Data Asset Locator System (MEDALS). This capability currently exists for all JEDMICS systems through the implementation of TECP-38 (JEDMICS interface with MEDALS). MEDALS will not be populating drawing index data in JCALS GDMS. All non-JEDMICS repositories (including ATIS repositories) will also be required to forward a copy of their drawing index data to MEDALS on a weekly basis. Specific sets of drawing index data will be consistently submitted to MEDALS in an acceptable data base format. Each set of index data will include information on the identity of the applicable repository, its mailing address, and a telephone number of a Point of Contact at the repository site.

Engineering Drawing Requests, Retrieval, and Distribution

All JCALS, Non-JCALS, local PC JEDMICS, and Non-PC JEDMICS users will first query the applicable Configuration Management (CM) System to research and confirm the applicable drawing number they want to electronically retrieve or order from the applicable repository. The JCALS user will use the GDMS on their desktop to locate, view, and retrieve the desired engineering drawing from a digital data

repository (i.e., JEDMICS, ATIS, etc.). The drawing Meta index data loaded in GDMS helps the JCALS user locate a digital copy of an engineerig drawing. The JCALS infrastructure will provide users electronic access to the applicable digital data repository via a C-2 compliant security environment. Discretionary access controls using Role Based Access Control (RBAC) and Organizational Based Access Control (OBAC) identifiers will be applied to the Drawing Meta index data to restrict user access to unauthorized drawings stored in a repository. If GDMS fails to locate a specific engineering drawing, JCALS users will be able to launch MEDALS from their desktop to locate and order the drawing. Local PC JEDMICS users with a PC JEDMICS account will be able to directly access their local JEDMICS repository to obtain a copy of a drawing. Non-JCALS and non-PC JEDMICS users will need to query MEDALS on-line via dial up means to locate and electronically order a digital or non-digital copy of the drawing from a cognizant repository. MEDALS will tell the user who the cognizant repository is and allow the user to electronically order the drawing. MEDALS will not provide the user the drawing data file itself. MEDALS users can also submit batch inquiries to MEDALS and have results back within 24 hours. MEDALS will allow the user to electronically order a drawing but cannot guarantee that the cognizant repository will honor the request. The repository will inform the requestor the status of their request, including the applicable cost, if any, to fill the order. For all operational ships, copies of all ship drawings and applicable Ships Drawing Indices will continue to be developed and distributed by the applicable Configuration Data Manager (CDM) via ATIS CDs. The data source for these drawing images will be from the applicable ship class JEDMICS repository.

Background

DON Drawing Repository and Distribution Strategy

The Department of the Navy (DON) is currently moving toward the establishment of a complete, reliable, end-to-end data management and delivery environment for its engineering drawing data. Numerous repositories have been established and are being maintained to store, convert, distribute, and back up digital engineering drawings and associated data.

Challenges

There are challenges associated with the electronic engineering drawing repository and distribution environment. These include:

- Electronic access must be controlled to maintain the integrity of proprietary rights. Also, NOFORN restrictions must be maintained,

and SBU as well as other classification requirements for documents must be adhered to and controlled.

- Easy access to the stored digital data must be provided.
- All recognized drawing repositories need to cooperate in forwarding their drawing data identification/indexing information at regular and frequent intervals.
- Drawing data identification/indexing elements must be consistent and compatible with the established drawing repositories (i.e., JEDMICS and ATIS) and data locating systems (i.e., JCALS GDMS, MEDALS).

Engineering Drawing Repositories and COOP

The increased use of digital media has reduced the need for a large number of engineering drawing storage sites. However, this event has increased the customer demands upon remaining data storage facilities.

The Navy definition of a data repository is one that will "receive, inspect, accept, and store the official record copy of data (camera ready masters) and to disseminate copies of the master data to established customers and other appropriate users". Within the Navy, drawing repositories operate under a decentralized concept. Decentralized repositories are located throughout various Systems Command activities. As appropriate, each repository maintains specific levels of engineering drawing data. One level can be the platform (i.e., ship, aircraft, etc.) or system/equipment level (i.e., a Hull, Mechanical and Electrical (HM&E), electronic, ordnance, missile All-Up-Round (AUR) item). The goal of a Navy drawing repository is to provide timely and accurate drawing data to end-users in support of their life cycle operational, maintenance, repair and acquisition requirements and actions, and in support of their preparation and update of other technical documents and publications.

Navy engineering drawings are currently stored in both hard copy and in digital format at officially recognized repository sites. Digital drawing data is being stored in the JEDMICS and ATIS Systems. Other digital data storage systems can and do exist and serve as engineering drawing repositories. These systems operate within their own local area networks, and most are not currently interconnected with the JEDMICS, ATIS, JCALS GDMS, or MEDALS systems. Computer Aided Design (CAD) generated 2D vector drawings are normally stored in numerous native CAD Systems which serve as local repositories for storing master 2D vector images. These systems also have no wide area interconnectivity.

DON has officially recognized the JEDMICS and ATIS Systems as digital drawing data repositories. JEDMICS repositories have been deployed to accommodate Navy, Marine Corps, and DLA requirements. JEDMICS was developed for the DoD community to efficiently convert, store,

protect, process, locate, and retrieve information previously contained on aperture cards and paper. The JEDMICS system is composed of a Windows based client workstation and a Reduced Instruction Set Computer (RISC) based server. JEDMICS supports UNIX and MS-DOS operating systems. The system stores data using a Relational Database Management System (RDBMS) and provides user access through a Graphical User Interface (GUI). The system employs commercial-off-the-shelf (COTS) software wherever possible. The major attributes of JEDMICS are as follows:

- Large engineering drawings and related text are stored on network accessible 14 inch optical media.
- Hard copy media such as aperture cards, molar, vellum, and bullion are accepted as input.
- Digital data from magnetic tape, optical platter, CAD stations, and other digital processes are also accepted as input.
- The data is indexed, checked, and stored in optical juke boxes.
- The stored images can be retrieved for viewing, editing, printing, or plotting. Near immediate on-line access from distributed workstations is provided.

The ATIS System is the Navy designated user presentation system designed to place current and accurate digital technical data into the shipboard and squadron users' hands. Shipboard ATIS provides the Fleet with a standard retrieval method for digital technical data. The user retrieves data on simple-to-use CD-ROM optical disks. Documentation stored and available on ATIS CD's include: engineering drawings; technical manuals; Planned Maintenance System (PMS) data; and Engineering Operating and Sequencing System (EOSS) data. ATIS is primarily used as a local use repository. The ATIS database and jukebox can be set up to emulate a JEDMICS repository. Its use within the JCALS environment is to simulate a JEDMICS repository. To the user, ATIS looks like a JEDMICS repository. An ATIS system serves as the digital drawing repository for the SSN 688 and SSBN 726 Class Submarines.

Each cognizant data repository is regularly producing a backed up copy of all engineering drawing data. However, an approved Continuity of Operations Plan (COOP) has not been established at each site. A system COOP is a standing set of procedures which will ensure that the designated drawing repository system can meet mission-critical operational requirements in spite of a significant compromise to its normal working environment. Thus a system COOP not only includes, but should exceed, a routine backup of system data and provisions in order to deal with catastrophic disruptions, such as those caused by natural disasters. Some sites have chosen to make backup platters and store them at a nearby site. This solution has merit in that it completely protects the sites from media damage and partially protects them from software damage. It does not, however, protect them from equipment damage or network outages. Some sites are currently sending copies of JEDMICS platters to a relatively distant backup site to ensure complete protection from media damage

and network outage and partial protection from software and equipment damage.

The EDMA and Converting and Storing Digital Drawings

The designated EDMA is responsible for the life cycle management of their assigned cognizant NAVSEA drawings. These drawings can be in a non-digital and digital format. The EDMA is responsible for maintaining their cognizant drawings current and for providing baseline and updated copies of drawing data to the appropriate engineering drawing data repository.

The Navy is currently converting thousands of legacy engineering drawings from a paper or aperture card format to a digital form or from a less intelligent digital form (i.e., raster) to a more intelligent digital format (i.e., vector). The raster images are being indexed and stored on optical media in JEDMICS or ATIS repository systems. As drawings are modified, they are "checked in" to a repository such as JEDMICS or a contractor's electronic storage system. Both the data and associated data structure index must be synchronized to reflect any new revision levels. JEDMICS tools currently do this for the user. As the data structure index is updated, the revision history is tracked. This provides a way to identify and retrieve previous baselines such as the "as built" and "as modified" configurations. Each JEDMICS repository also electronically sends a copy of the engineering drawing index information to JCALS GDMS.

Indexing, Locating, and Requesting Drawings – Current Status

Currently, there is no single Navy indexing system used and maintained to facilitate global locating and ordering engineering drawings from existing drawing repositories. Each repository maintains an engineering drawing index for their stored cognizant drawings and associated data. All JEDMICS sites currently provide drawing meta index data to JCALS GDMS. Meta index data is being extracted from the ATIS drawing databases (at Newport News Shipbuilding and Electric Boat) and loaded into GDMS. JCALS users are able to use GDMS to locate and retrieve a digital drawing if it is stored on a JEDMICS or ATIS system. JCALS users are unable to easily locate and obtain a non-digital engineering drawing stored at a Navy repository site. Also, non-JCALS users have no easy means to locate and order an engineering drawing.

MEDALS is currently available for locating all Navy's drawings, but has yet to be incorporated into the JCALS infrastructure. MEDALS is an Automated Information System (AIS) that indexes all DOD engineering data. Users can query on-line to locate and order copies of engineering drawings in single or via batch high volume searches. Public Law No. 98525, HR 5167, Section 1252 mandated MEDALS.

To locate a specific engineering drawing, the JCALS or Non-JCALS user first needs to identify the document they want. A typical document identifier (doc ID) will include the manufacturers or Navy drawing number, the CAGE, document type, and revision level. Without knowing the full doc ID, the data requester may not be able to obtain the correct data. Even if users know the drawing number and CAGE, they often do not know the correct revision level. Users can research the correct drawing and revision level via the applicable Configuration Management (CM) system (i.e. Configuration Data Manager's Database, Open Architecture (CDMD-OA) or Configuration Management Information System (CMIS)). The CM system will allow users to determine and confirm the correct doc ID, including revision level, for a particular system or equipment on a specific platform (i.e. applicable ship class and hull number. Users can also research their drawing via the Ships Drawing Index (SDI) capabilities built into JCALS.

The JCALS infrastructure provides users electronic access to digital data repositories (i.e., JEDMICS) in a C-2 compliant security environment. This environment is required for users accessing, retrieving, storing, and transferring Sensitive But Unclassified (SBU) data across multiple information systems. The JCALS security environment includes Wide Area Network (WAN) Data Encryption Units (DEUs) to ensure the secure transfer of data between repositories and users. The environment will also ensure strict user Identification and Authentication (I & A) and will control access to information based on a user's role and organization.